THE CELL IN DEVELOPMENT AND INHERITANCE. By EDMUND B. WILSON, Ph.D., Professor of Invertebrate Zoölogy, Columbia University. (Columbia University Biological Series, IV.) 8vo., pp. xvi., 371. New York: The Macmillan Company, 1896.

IN this day of rapid development of medicine along broad lines of scientific achievement it is particularly desirable that the physician should be in touch with the progress in all those cognate sciences which can in any way contribute to that development. As a student of disease he should be well grounded in all the essential facts of the phenomena of life, and should be in a measure their exponent in his community. For this reason it is a very agreeable duty to call the attention of our readers to the *Columbia University Biological Series*, edited by Professor Henry F. Osborn, the fourth volume of which has recently appeared and is the special subject of this review. An account of the progress of the idea of evolution "From the Greeks to Darwin," "Amphioxus and the Ancestry of the Vertebrates," "Fishes, Living and Fossil," are subjects which may well occupy the attention of the physician of an evening, and are sure to afford suggestions of biological relations which must prove of service in broadening his conception of disease. And while these works are scientific to the core, their contents are so presented as to make the hours spent in their perusal most enjoyable.

The Cell in Development and Inheritance is a most delightful book in every particular. It is only necessary to turn hastily the pages to become aware of the clear, sharply cut typography and of the wealth and beauty of the illustrations. No such collection of pictures representing the minuter structure of the cell in the various phases of its life-history has ever before been brought together. The bibliography is abundant, and is conveniently arranged for reference, a list of the more important works upon each topic being appended to each chapter, while a fuller bibliography is added at the end of the volume. A glossary, too, is found here of the many terms which have sprung into existence to meet the requirements of modern cytological research, and carefully prepared indices, both of authors and subjects, add greatly to the usefulness of the book as a work of reference. In every sense it is a model of good book-making, which might with profit be copied by many an author and publisher.

But while we cannot repress the desire to speak thus of the physical attractiveness of the book, it is more particularly its clear and elegant statement of our knowledge of the cell, of its structure and of its functions, in so far as they bear upon the processes of reproduction and heredity, which we would bring to the notice of our readers.

The half century which has elapsed since the enunciation of the cell-theory by Schleiden and Schwann has added ever-increasing evidence of the correctness of that theory, until now the anatomist, the physiologist, and the pathologist, whether of plant or animal life, seeks in the cell the ultimate explanation of all the phenomena which he would interpret. It is but natural, then, that we should look to the cell for light upon the various problems of heredity, and in Prof. Wilson's book we find an able and entertaining exposition of all those structural and physiological properties of the cell which have bearing upon these problems.

The subject is very properly introduced by a historical sketch of the development of our ideas of cell structure and function and of the various theories of inheritance. This is followed in successive chapters by statements of the general morphology of the cell, of the process of cell-division, of the peculiarities and mode of origin of the germ-cells, of fertilization of the ovum, of the preparation of the germ-cells to participate in the conjugation incident to fertilization, of those aspects of cell-chemistry and physiology which furnish suggestions as to heredity, of segmentation or cleavage of the fertilized ovum; and, finally, the various theories of inheritance and development are discussed in the light of our present knowledge of all these phenomena.

It is impossible within the narrow limits of a review to give any adequate statement of the conclusions arrived at. In general it may be said that Prof. Wilson agrees with Hertwig, Strassburger, Kölliker, and Weismann in attributing the predominant influence in heredity transmission to the chromatin of the nucleus. While realizing the significance of this fact, it is, nevertheless, admitted that "the explanation of development is at present beyond our reach." "Despite all our theories we no more know how the properties of the idioplasm[1] involve the properties of the adult body than we know how the properties of hydrogen and oxygen involve those of water. So long as the chemist and physicist are unable to solve so simple a problem of physical causality as this, the embryologist may well be content to reserve his judgment on a problem a hundredfold more complex." Regarding the historical origin of the idioplasm it is stated that "the idioplasm of every species has been derived by the modification of a pre-existing idioplasm through variation, and the survival of the fittest. Whether these variations first arise in the idioplasm of the germ-cells, as Weismann maintains, or whether they may arise in the body-cells, and then be reflected back upon the idioplasm, is a question on which, as far as I can see, the study of the cell has not thus far thrown a ray of light." "We are utterly ignorant of the manner in which the idioplasm of the germ-cell can so respond to the play of physical forces upon it as to call forth an adaptive variation."

Incomplete and unsatisfactory as these conclusions may appear, they nevertheless represent a distinct advance toward the solution of the profoundest problem of biology. "The splendid achievements of cell-research in the past twenty years stand as the promise of its possibilities for the future, and we need set no limit to its advance. To Schleiden and Schwann the present standpoint of the cell-theory might well have seemed unattainable. We cannot foretell its future triumphs, nor can we repress the hope that step by step the way may yet be opened to an understanding of inheritance and development." J. S. E.

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[1] "The substance now generally identified with chromatin, which by its inherent organization involves the characteristics of the species. The physical basis of inheritance."